NAEP 2003 Mathematics Report for South Dakota

KEY FINDINGS

For grade 4:

- The average mathematics scale score for students in South Dakota was 237.
- South Dakota's average score (237) was higher than that of the nation's public schools (234).
- Students' average scores in South Dakota were higher than those in 22 jurisdictions, not significantly different from those in 22 jurisdictions, and lower than those in 8 jurisdictions.
- The percentage of students in South Dakota who performed at or above the *Proficient* level was 34 percent.
- In South Dakota, the percentage of students who performed at or above *Proficient* was not found to differ significantly from that for the nation's public schools (31 percent).

For grade 8:

- The average mathematics scale score for students in South Dakota was 285.
- South Dakota's average score (285) was higher than that of the nation's public schools (276).
- Students' average scores in South Dakota were higher than those in 37 jurisdictions, not significantly different from those in 14 jurisdictions, and lower than those in 1 jurisdiction.
- The percentage of students in South Dakota who performed at or above the *Proficient* level was 35 percent.
- In South Dakota, the percentage of students who performed at or above *Proficient* was higher than that for the nation's public schools (27 percent).

This report provides selected results from the National Assessment of Educational Progress (NAEP) for South Dakota's public-school students at grades 4 and 8. Since 1990, mathematics has been assessed in five different years at the state level (at grade 8 in 1990, and at both grades 4 and 8 in 1992, 1996, 2000, and 2003). In 2003, 53 jurisdictions participated: the 50 states, District of Columbia, Department of Defense Domestic Dependent Elementary and Secondary Schools, and Department of Defense Dependents Schools (Overseas). South Dakota participated and met the criteria for reporting public-school results at both grades 4 and 8 in 2003.

NAEP is a project of the National Center for Education Statistics (NCES). For more information about the assessment, see *The Nation's Report Card, Mathematics Highlights 2003* or *The Nation's Report Card: Mathematics 2003*, which will be available in 2004. The full set of results is available in an interactive database on the NAEP web site (http://nces.ed.gov/nationsreportcard/). Released test questions, scoring guides, and question-level performance data are also available on the web site.

The U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) has provided software that generated user-selectable data, statistical significance test result statements, and technical descriptions of the NAEP assessments for this report. Content may be added or edited by states or other jurisdictions. This document, therefore, is not an official publication of the National Center for Education Statistics.

Introduction

How Is Student Mathematics Performance Reported?

The results of student performance on the NAEP assessments are reported for various groups of students (e.g., fourth-grade female students or students who took the assessment in different years). NAEP does not produce scores for individual students, or report scores for schools. Nor are data produced for school districts, except that some large urban districts voluntarily participated in the assessment on a trial basis and were sampled as states were sampled. Mathematics performance for groups of students is reported in two ways: 1) average scale scores and 2) achievement levels.

Scale Scores: Student performance is reported as an average score based on the NAEP mathematics scale, which ranges from 0 to 500 and is linked to the corresponding scales in 1990, 1992, 1996, and 2000. Subscales were created to reflect performance on each of the five content areas defined in the NAEP mathematics framework. An overall composite scale was developed by weighting each of the mathematics subscales for the grade based on its relative importance in the framework. This composite scale is the metric used to present the average scale scores and selected percentiles used in NAEP reports.

Achievement Levels: Student mathematics performance is also reported in terms of three achievement levels—*Basic, Proficient*, and *Advanced*. Results based on achievement levels are expressed in terms of the percentage of students who attained each level. The three achievement levels are defined as follows:

- *Basic:* This level denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade.
- *Proficient:* This level represents solid academic performance for each grade assessed. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.
- *Advanced:* This level signifies superior performance.

The achievement levels are performance standards adopted by the National Assessment Governing Board (NAGB) as part of its statutory responsibilities mandated by Congress. The levels represent collective judgments of what students should know and be able to do for each grade tested. They are based on recommendations made by broadly representative panels of classroom teachers, education specialists, and members of the general public. As provided by law, the National Center for Education Statistics (NCES), upon review of congressionally mandated evaluations of NAEP, has determined that the achievement levels are to be used on a trial basis until it is determined that the achievement levels are "reasonable, valid, and informative to the public."[1] However, both NCES and NAGB believe these performance standards are useful for understanding trends in student achievement. They have been widely used by national and state officials as a common yardstick for academic performance. The mathematics achievement-level descriptions are summarized in figure 1.

Cautions in Interpreting Results

The averages and percentages in this report have a standard error—a range of up to a few points above or below the score—which takes into account potential score fluctuation due to sampling error and measurement error. Statistical tests that factor in these standard errors are used to determine whether the differences between average scores or percentages are significant. All differences were

tested for statistical significance at the 0.05 level. NAEP sample sizes have increased since 2002 compared to previous years, resulting in smaller standard errors. As a consequence, smaller differences are detected as statistically significant than in previous assessments.

In this report, statistically significant differences are referred to as "significant differences" or "significantly different." Significant differences between 2003 and prior assessments are marked with a notation (*) in the tables. Any differences in scores within a year or across years that are mentioned in the text as "higher," "lower," "greater," or "smaller" are statistically significant.

Estimates based on small subgroups are likely to have large standard errors. Consequently some seemingly large differences may not be statistically significant. The reader is cautioned to rely on reported differences in the tables and/or text, which are statistically significant, rather than on the apparent magnitude of any difference. Readers are also cautioned against interpreting NAEP results causally. Inferences related to subgroup performance, for example, should take into account the many socioeconomic and educational factors that may affect student performance.

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1. No Child Left Behind Act of 2001, Pub. L. No. 107–110, 115 Stat. 1425 (2001).

FIGURE 1A

The Nation's Report Card 2003 State Assessment

Descriptions of NAEP mathematics achievement levels, grade 4

Basic Level (214)	Fourth-grade students performing at the *Basic* level should show some evidence of understanding the mathematical concepts and procedures in the five NAEP content areas.

For example, fourth-graders performing at the *Basic* level should be able to estimate and use basic facts to perform simple computations with whole numbers, show some understanding of fractions and decimals, and solve some simple real-world problems in all NAEP content areas. Students at this level should be able to use—though not always accurately—four-function calculators, rulers, and geometric shapes. Their written responses are often minimal and presented without supporting information.

Proficient Level (249)	Fourth-grade students performing at the *Proficient* level should consistently apply integrated procedural knowledge and conceptual understanding to problem solving in the five NAEP content areas.

For example, fourth-graders performing at the *Proficient* level should be able to use whole numbers to estimate, compute, and determine whether results are reasonable. They should have a conceptual understanding of fractions and decimals; be able to solve real-world problems in all NAEP content areas; and use four-function calculators, rulers, and geometric shapes appropriately. Students performing at the *Proficient* level should employ problem-solving strategies such as identifying and using appropriate information. Their written solutions should be organized and presented both with supporting information and explanations of how they were achieved.

Advanced Level (282)	Fourth-grade students performing at the *Advanced* level should apply integrated procedural knowledge and conceptual understanding to complex and nonroutine real-world problem solving in the five NAEP content areas.

For example, fourth-graders performing at the *Advanced* level should be able to solve complex and nonroutine real-world problems in all NAEP content areas. They should display mastery in the use of four-function calculators, rulers, and geometric shapes. The students are expected to draw logical conclusions and justify answers and solution processes by explaining why, as well as how, they were achieved. They should go beyond the obvious in their interpretations and be able to communicate their thoughts clearly and concisely.

NOTE: The scores in parentheses indicate the cutpoint on the scale at which the achievement-level range begins.
SOURCE: National Assessment Governing Board. (2002). *Mathematics Framework for the 2003 National Assessment of Educational Progress.* Washington, DC: Author.

FIGURE 1B

The Nation's Report Card 2003 State Assessment

Descriptions of NAEP mathematics achievement levels, grade 8

Basic Level (262)	Eighth-grade students performing at the *Basic* level should exhibit evidence of conceptual and procedural understanding in the five NAEP content areas. This level of performance signifies an understanding of arithmetic operations—including estimation—on whole numbers, decimals, fractions, and percents.

For example, eighth-graders performing at the *Basic* level should complete problems correctly with the help of structural prompts such as diagrams, charts, and graphs. They should be able to solve problems in all NAEP content areas through the appropriate selection and use of strategies and technological tools—including calculators, computers, and geometric shapes. Students at this level also should be able to use fundamental algebraic and informal geometric concepts in problem solving.

As they approach the *Proficient* level, students at the *Basic* level should be able to determine which of the available data are necessary and sufficient for correct solutions and use them in problem solving. However, these eighth-graders show limited skill in communicating mathematically.

Proficient Level (299)	Eighth-grade students performing at the *Proficient* level should apply mathematical concepts and procedures consistently to complex problems in the five NAEP content areas.

For example, eighth-graders performing at the *Proficient* level should be able to conjecture, defend their ideas, and give supporting examples. They should understand the connections among fractions, percents, decimals, and other mathematical topics such as algebra and functions. Students at this level are expected to have a thorough understanding of *Basic*-level arithmetic operations—an understanding sufficient for problem solving in practical situations.

Quantity and spatial relationships in problem solving and reasoning should be familiar to them, and they should be able to convey underlying reasoning skills beyond the level of arithmetic. They should be able to compare and contrast mathematical ideas and generate their own examples. These students should make inferences from data and graphs, apply properties of informal geometry, and accurately use the tools of technology. Students at this level should understand the process of gathering and organizing data and be able to calculate, evaluate, and communicate results within the domain of statistics and probability.

Advanced Level (333)	Eighth-grade students performing at the *Advanced* level should be able to reach beyond the recognition, identification, and application of mathematical rules in order to generalize and synthesize concepts and principles in the five NAEP content areas.

For example, eighth-graders performing at the *Advanced* level should be able to probe examples and counterexamples in order to shape generalizations from which they can develop models. Eighth-graders performing at the *Advanced* level should use number sense and geometric awareness to consider the reasonableness of an answer. They are expected to use abstract thinking to create unique problem-solving techniques and explain the reasoning processes underlying their conclusions.

NOTE: The scores in parentheses indicate the cutpoint on the scale at which the achievement-level range begins.
SOURCE: National Assessment Governing Board. (2002). *Mathematics Framework for the 2003 National Assessment of Educational Progress.* Washington, DC: Author.

NAEP Mathematics 2003 Overall Scale Score and Achievement-Level Results for Public School Students

Overall Scale Score Results

In this section student performance is reported as an average score based on the NAEP mathematics scale, which ranges from 0 to 500. Scores on this scale are comparable from 1990 through 2003.

Tables 1A and 1B show the overall performance results of grades 4 and 8 public school students in South Dakota and the nation. The first column of results presents the average score on the NAEP mathematics scale. The subsequent columns show the score at selected percentiles. The percentile indicates the percentage of students who performed below the score for that percentile. For example, 10 percent of the students had scores that were lower than the score shown for the 10th percentile.

Grade 4 Scale Score Results

- In 2003, the average scale score for students in South Dakota was 237. This was higher than that of students across the nation (234).

TABLE 1A

The Nation's Report Card 2003 State Assessment

Average mathematics scale scores and selected percentiles, grade 4 public schools: 2003

		Average Scale Score	Scale score distribution				
			10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Accommodations permitted							
2003	South Dakota	237 (0.7)	204 (1.9)	221 (1.1)	239 (0.8)	255 (0.9)	269 (1.2)
	Nation (Public)	234 (0.2)	196 (0.3)	215 (0.3)	235 (0.2)	254 (0.3)	270 (0.2)

NOTE: The NAEP mathematics scale ranges from 0 to 500. The standard errors of the statistics in the table appear in parentheses. All differences were tested for statistical significance at the 0.05 level using unrounded numbers. Performance comparisons may be affected by differences in exclusion rates for students with disabilities and limited-English-proficient students in the NAEP samples and changes in sample sizes. NAEP sample sizes have increased since 2002 compared to previous years, resulting in smaller detectable differences than in previous assessments. In addition to allowing for accommodations, the accommodations-permitted results for national public schools (2000 and 2003) differ slightly from previous years' results, and from previously reported results for 2000, due to changes in sample weighting procedures.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

Grade 8 Scale Score Results

- In 2003, the average scale score for students in South Dakota was 285. This was higher than that of students across the nation (276).

TABLE 1B

The Nation's Report Card 2003 State Assessment

Average mathematics scale scores and selected percentiles, grade 8 public schools: 2003

		Average Scale Score	Scale score distribution				
			10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile
Accommodations permitted							
2003	South Dakota	285 (0.8)	244 (2.7)	266 (1.1)	287 (0.7)	307 (0.7)	323 (1.3)
	Nation (Public)	276 (0.3)	228 (0.6)	253 (0.4)	278 (0.4)	301 (0.3)	321 (0.3)

NOTE: The NAEP mathematics scale ranges from 0 to 500. The standard errors of the statistics in the table appear in parentheses. All differences were tested for statistical significance at the 0.05 level using unrounded numbers. Performance comparisons may be affected by differences in exclusion rates for students with disabilities and limited-English-proficient students in the NAEP samples and changes in sample sizes. NAEP sample sizes have increased since 2002 compared to previous years, resulting in smaller detectable differences than in previous assessments. In addition to allowing for accommodations, the accommodations-permitted results for national public schools (2000 and 2003) differ slightly from previous years' results, and from previously reported results for 2000, due to changes in sample weighting procedures.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

Overall Achievement-Level Results

In this section student performance is reported as the percentage of students performing relative to standards set by the National Assessment Governing Board (NAGB). These performance standards for what students should know and be able to do were based on the recommendations of broadly representative panels of educators and members of the public.

Tables 2A and 2B present the percentage of students at grades 4 and 8 who performed below *Basic*, at or above *Basic*, at or above *Proficient*, and at the *Advanced* level. Because the percentages are cumulative from *Basic* to *Proficient* to *Advanced*, they sum to more than 100 percent. Only the percentage of students performing at or above *Basic* (which includes the students at *Proficient* and *Advanced*) plus the students below *Basic* will sum to 100 percent (except for rounding).

Grade 4 Achievement-Level Results

- In 2003, the percentage of South Dakota's students who performed at or above the *Proficient* level was 34 percent. This was not found to differ significantly from the percentage of the nation's public school students who performed at or above *Proficient* (31 percent).

TABLE 2A

The Nation's Report Card 2003 State Assessment

Percentage of students at or above each mathematics achievement level, grade 4 public schools: 2003

		Below *Basic*	At or above *Basic*	At or above *Proficient*	At or above *Advanced*
Accommodations permitted					
2003	South Dakota	18 (1.0)	82 (1.0)	34 (1.3)	3 (0.4)
	Nation (Public)	24 (0.3)	76 (0.3)	31 (0.3)	4 (0.1)

NOTE: The standard errors of the statistics in the table appear in parentheses. Achievement levels correspond to the following points on the NAEP mathematics scale: below *Basic*, 213 or lower; *Basic*, 214-248; *Proficient*, 249-281; and *Advanced*, 282 and above. All differences were tested for statistical significance at the 0.05 level using unrounded numbers. Details may not sum to totals due to rounding. Performance comparisons may be affected by differences in exclusion rates for students with disabilities and limited-English-proficient students in the NAEP samples and changes in sample sizes. NAEP sample sizes have increased since 2002 compared to previous years, resulting in smaller detectable differences than in previous assessments. In addition to allowing for accommodations, the accommodations-permitted results for national public schools (2000 and 2003) differ slightly from previous years' results, and from previously reported results for 2000, due to changes in sample weighting procedures.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

Grade 8 Achievement-Level Results

- In 2003, the percentage of South Dakota's students who performed at or above the *Proficient* level was 35 percent. This was greater than the percentage of the nation's public school students who performed at or above *Proficient* (27 percent).

TABLE 2B

The Nation's Report Card 2003 State Assessment

Percentage of students at or above each mathematics achievement level, grade 8 public schools: 2003

		Below *Basic*	At or above *Basic*	At or above *Proficient*	At or above *Advanced*
Accommodations permitted					
2003	South Dakota	22 (1.3)	78 (1.3)	35 (1.1)	5 (0.5)
	Nation (Public)	33 (0.3)	67 (0.3)	27 (0.3)	5 (0.1)

NOTE: The standard errors of the statistics in the table appear in parentheses. Achievement levels correspond to the following points on the NAEP mathematics scale: below *Basic*, 261 or lower; *Basic*, 262-298; *Proficient*, 299-332; and *Advanced*, 333 and above. All differences were tested for statistical significance at the 0.05 level using unrounded numbers. Details may not sum to totals due to rounding. Performance comparisons may be affected by differences in exclusion rates for students with disabilities and limited-English-proficient students in the NAEP samples and changes in sample sizes. NAEP sample sizes have increased since 2002 compared to previous years, resulting in smaller detectable differences than in previous assessments. In addition to allowing for accommodations, the accommodations-permitted results for national public schools (2000 and 2003) differ slightly from previous years' results, and from previously reported results for 2000, due to changes in sample weighting procedures.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

Comparisons Between South Dakota and Other Participating States and Jurisdictions

In 2003, 53 jurisdictions participated in the mathematics assessment. These include the 50 states, the District of Columbia and the two groups of Department of Defense Education Activity (DoDEA) schools: Domestic Dependent Elementary and Secondary Schools (DDESS) and Department of Defense Dependents Schools (DoDDS).

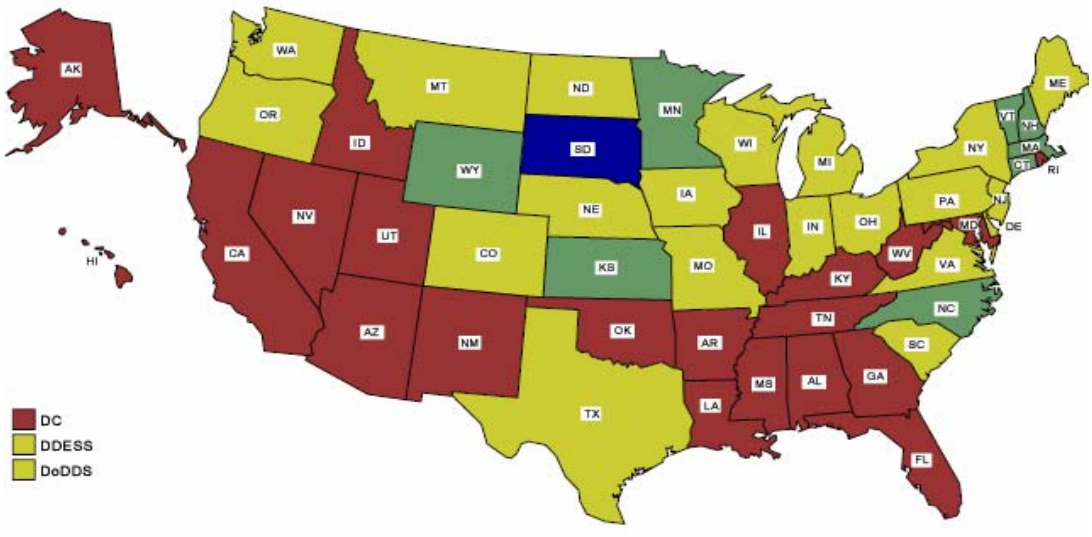
Comparisons by Average Scale Scores

Figures 2A and 2B compare South Dakota's 2003 overall mathematics scale scores at grades 4 and 8 with those of all other participating states and jurisdictions. The different shadings indicate whether a state's or jurisdiction's average scale score was found to be higher than, lower than, or not significantly different from that of South Dakota in the NAEP 2003 mathematics assessment.

FIGURE 2A

The Nation's Report Card 2003 State Assessment

South Dakota's average mathematics scale score compared with scores for other participating jurisdictions, grade 4 public schools: 2003

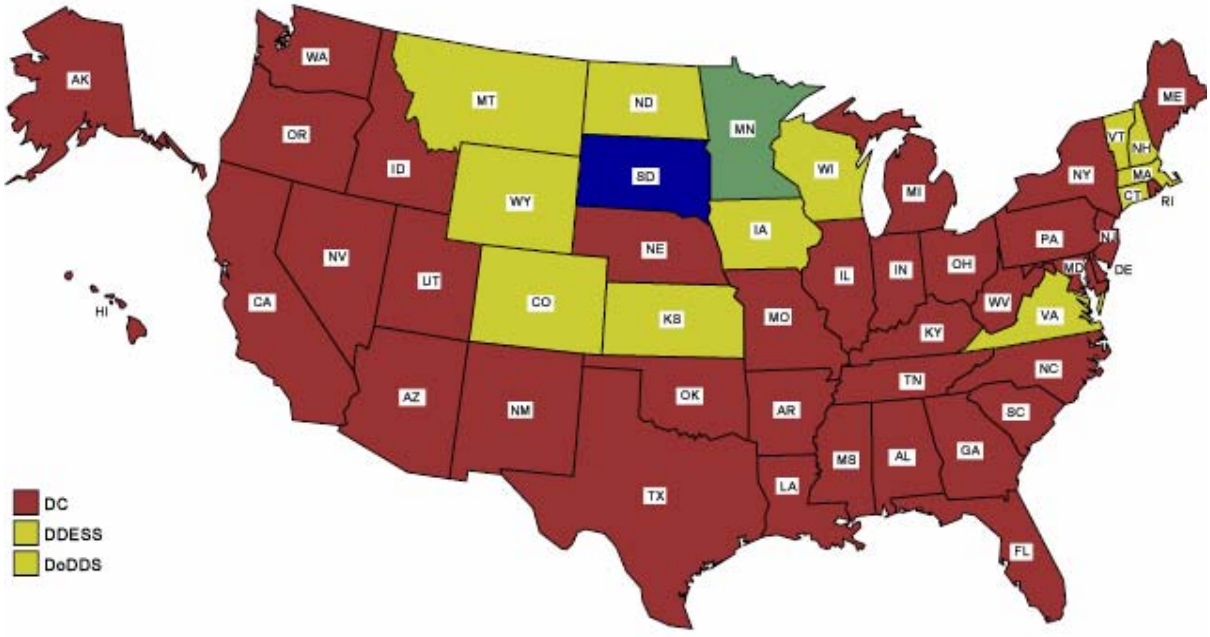


DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools.
DoDDS: Department of Defense Dependents Schools (Overseas).
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

FIGURE 2B

The Nation's Report Card 2003 State Assessment

South Dakota's average mathematics scale score compared with scores for other participating jurisdictions, grade 8 public schools: 2003



Focal state/jurisdiction (South Dakota)
State/jurisdiction had a higher average scale score than focal state/jurisdiction
State/jurisdiction was not found to be significantly different from focal state/jurisdiction
State/jurisdiction had a lower average scale score than focal state/jurisdiction

DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools.
DoDDS: Department of Defense Dependents Schools (Overseas).
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

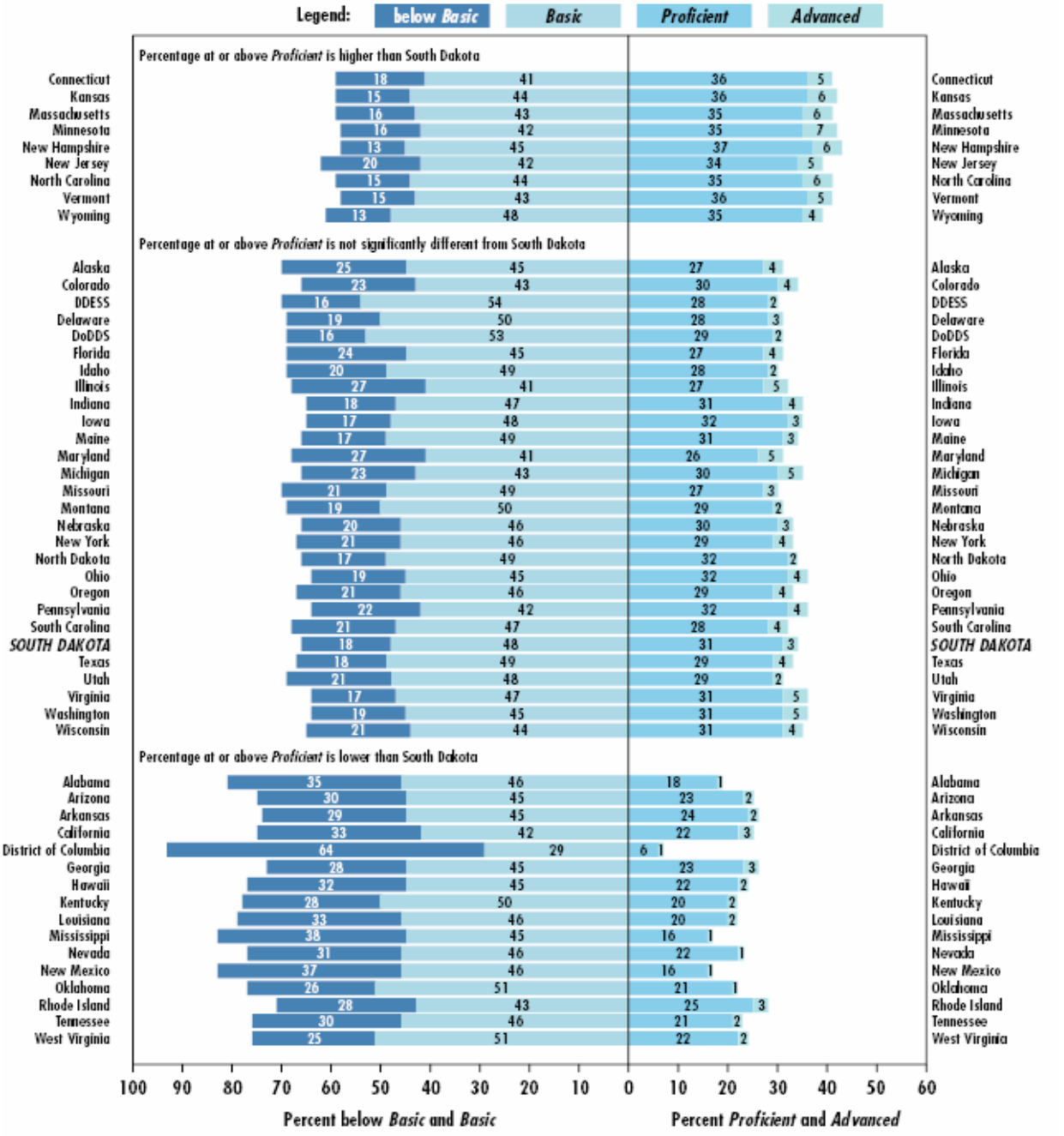
Comparisons by Achievement Levels

Figures 3A and 3B permit comparisons of all jurisdictions participating in the NAEP 2003 mathematics assessment in terms of percentages of grades 4 and 8 students performing at or above the *Proficient* level. The participating states and jurisdictions are grouped into categories reflecting student performance compared to that in South Dakota. The jurisdictions are grouped by whether the percentage of their students with scores at or above the *Proficient* level (including *Advanced*) was found to be higher than, not significantly different from, or lower than the percentage in South Dakota. Note that the arrangement of the states and the other jurisdictions within each category is alphabetical; statistical comparisons among jurisdictions in each of the three categories are not included in this report.

FIGURE 3A

The Nation's Report Card 2003 State Assessment

Percentage of students within each mathematics achievement-level range, and South Dakota's percentage at or above Proficient compared with other participating jurisdictions, grade 4 public schools: By state, 2003

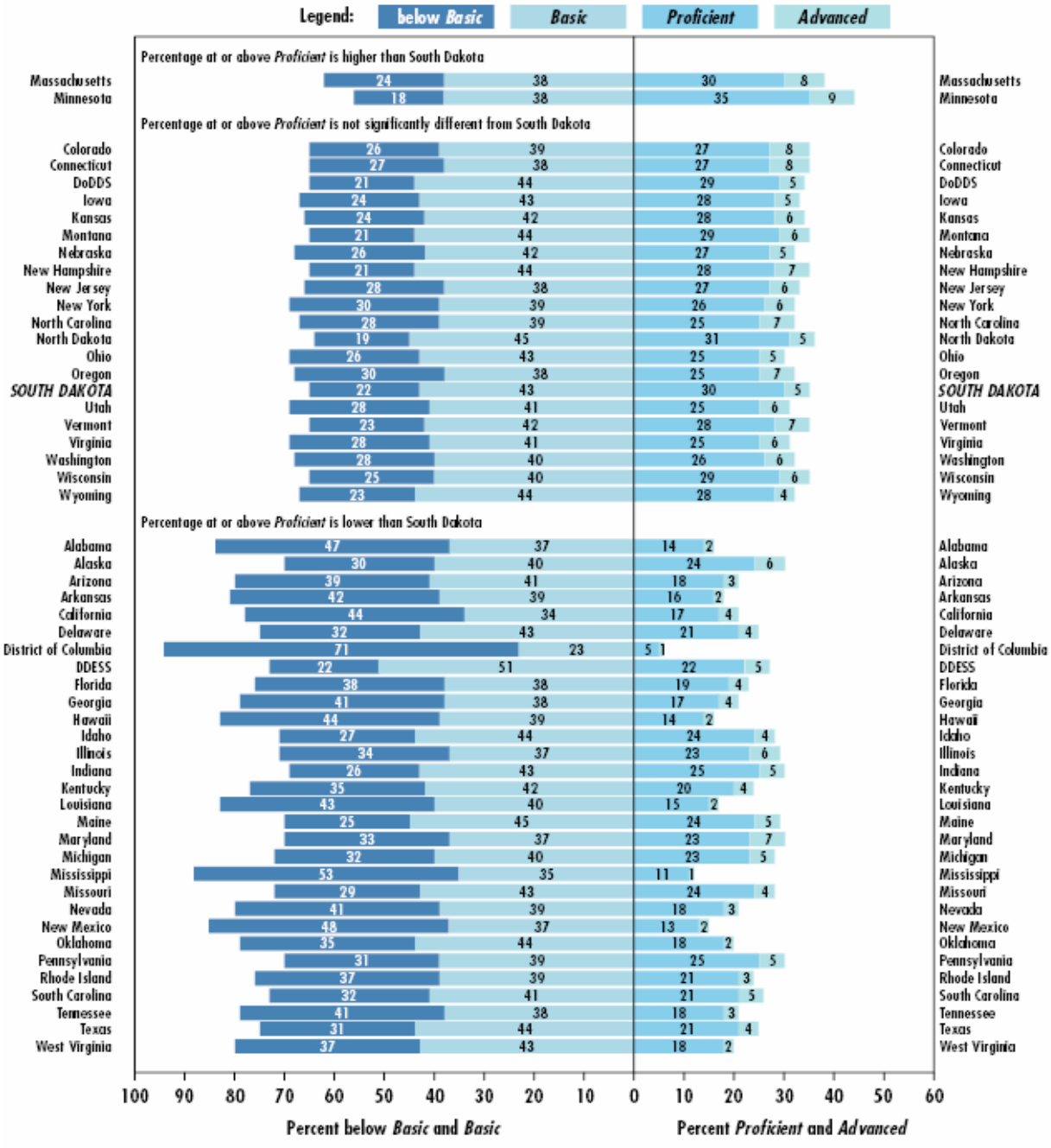


DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools.
DoDDS: Department of Defense Dependents Schools (Overseas).
NOTE: The bars above contain percentages of students in each NAEP mathematics achievement range. Achievement levels corresponding to each population of students are aligned at the point where the *Proficient* category begins, so that they may be compared at *Proficient* and above. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.

FIGURE 3B

The Nation's Report Card 2003 State Assessment

Percentage of students within each mathematics achievement-level range, and South Dakota's percentage at or above Proficient compared with other participating jurisdictions, grade 8 public schools: By state, 2003



DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools.
DoDDS: Department of Defense Dependents Schools (Overseas).
NOTE: The bars above contain percentages of students in each NAEP mathematics achievement range. Achievement levels corresponding to each population of students are aligned at the point where the *Proficient* category begins, so that they may be compared at *Proficient* and above. Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment.